Amendments to the Claims

This listing of the claims will replace all prior versions, and listings, of claims in the application:

Claims 1 to 29 (canceled)

30. (Original) A mass spectrometer, comprising:

a linear ion trap having a quadrupolar rod set for generating a substantially quadrupole RF trapping field and a set of additional electrodes for superimposing a higher order multipole field to the trapping field;

means for providing a background gas in said trap at a pressure of less than approximately 9×10^{-5} Torr;

means for introducing ions into said trap;

means for applying a resonant excitation signal in order to promote collision-induced dissociation of selected ions; and

means for mass analyzing the trapped ions to generate a mass spectrum.

31. (Original) A mass spectrometer according to claim 30, wherein a DC voltage potential is present between the rods of the quadrupole rod set and the additional electrodes.

32. (Original) A mass spectrometer according to claim 31, wherein said DC voltage potential is varied depending on the m/z value or values of selected resonantly excited ions.

33. (Original) A mass spectrometer according to claim 30, wherein selected trapped ions are subjected to an alternating potential from said excitation signal that does not exceed approximately $1V_{(0\text{-}pk)}$, for a period exceeding 25 ms.

34. (Original) A mass spectrometer according to claim 33, wherein the selected trapped ions are subjected to an alternating potential having a maximum amplitude of 550 $mV_{(0\text{-}pk)}$, for a period of less than 550 ms.

35. (Original) A mass spectrometer according to claim 30, wherein four additional electrodes are interposed between the rods of the quadrupole rod set in order to approximate an octopole field.

36. (Original) A mass spectrometer according to claim 31, wherein each additional electrode is a T-shaped electrode having either a tapering or non-tapering stem section.

37. (Original) A mass spectrometer, comprising:

a linear ion trap including means for generating a substantially quadrupole RF trapping field and means for superimposing a higher order multipole field to the trapping field;

means for providing a background gas in said trap at a pressure of less than approximately 9×10^{-5} Torr;

means for introducing ions into said trap;

means for applying a resonant excitation signal in order to promote collision-induced dissociation of selected ions; and

means for mass analyzing the trapped ions to generate a mass spectrum.

38. (Original) A mass spectrometer according to claim 37, wherein selected ions trapped in said trap are subjected to an alternating potential from said excitation signal that does not exceed approximately $1V_{(0\text{-}pk)}$, for a period exceeding approximately 25 ms.

39. (Original) In a Penning trap having at least four planar or curved-surface electrodes for constraining ions radially and at least two electrodes for constraining ions axially, an improvement comprising at least one additional electrode interposed between any two adjacent radially-constraining electrodes, and a voltage generator for establishing a DC potential voltage between each additional electrode and the adjacent radial-constraining electrode.